ML610Q178 Reference Board User's Manual

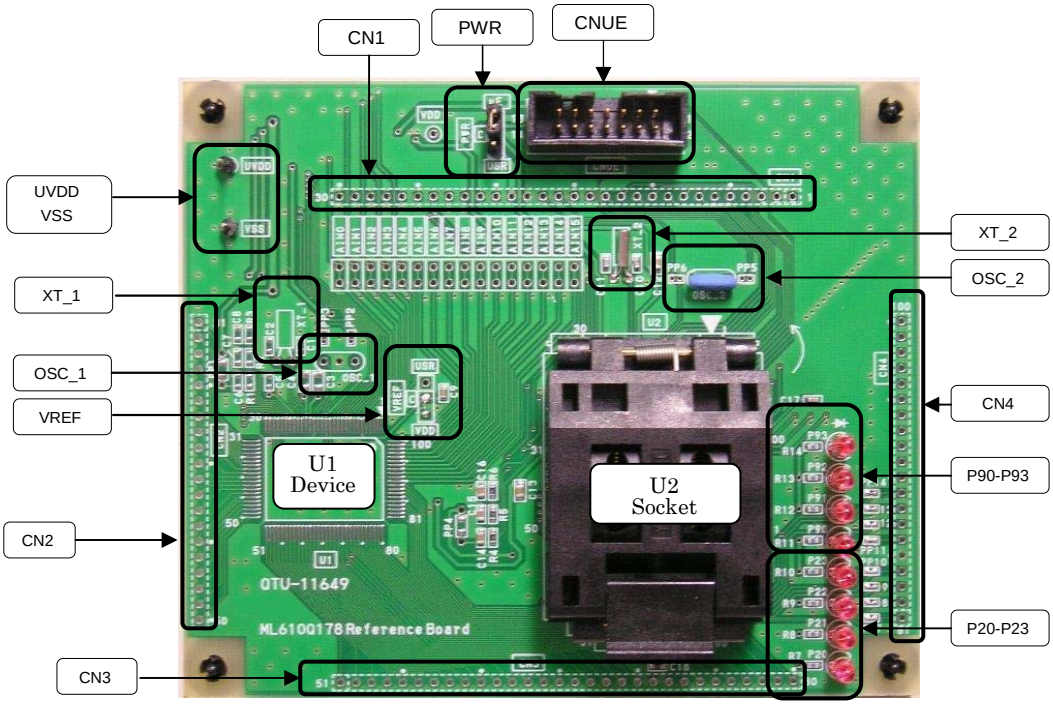
ML610Q178 Reference board is prepared by LAPIS SEMICONDUCTOR to have you study the operations of ML610Q178.
The board is arranged so that necessary components are mounted by you according to your purpose, then only minimum necessary components are mounted on the board by LAPIS SEMICONDUCTOR for brief use of ML610Q178.
By using the board with "uEASE on-chip debug emulator" (hereinafter referred to "uEASE") and "free sample U8 Development Tools CD-ROM" which is bundled in the package of uEASE not only Software development/debugging but also writing Flash ROM in the devices are capable.
This board also works in stand alone mode with external power suppy without uEASE.
Before starting works with this board, read below carefully and understand notices.

1. The board features
   Incorporates ML610Q178 or 100pin IC-Socket
   Supports flash ROM programming and on-chip debugging (using TEST0 and TEST1_N pins)
   High extendibility; Through-holes for your peripheral board are equipped with microcontroller pins
   The power supply used can be selected (uEASE or peripheral board)
   Prepared the pad to mount parts (parts necessary for microcontroller operation)

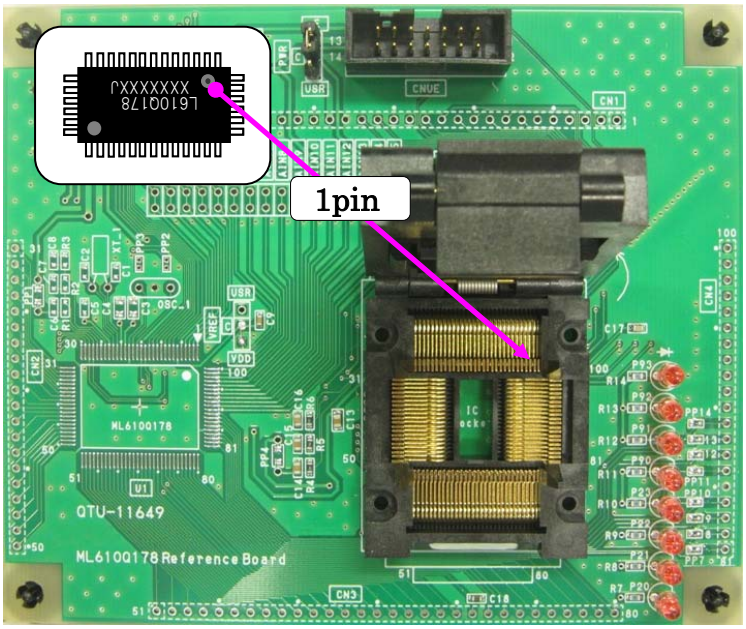
2. The board hardware specifications
   Please refer to the reference schematics for detail on connections of each hardware parts.

Embedded microcontroller	U1/U2(Mounting / IC-Socket): ML610Q178
Embedded parts	・ UVDD、VSS: Input power supply pin
	・ PWR: Jumper for input power supply switch (3pin pin-header and short pin)
	・ XT_1/XT_2(Mounting / IC-Socket): 32.768kHz oscillator
	・ OSC_1/OSC_2(Mounting / IC-Socket): 8MHz oscillator
	・ P20-P23,P90-P93: Light emitting diodes
	・ CNUE: Connector for on-chip debug emulator (14pin connector)
	・ C1-C2/C10-C11(Mounting / IC-Socket): Capacitors for 32.768kHz oscillator (2pieces)
	・ C3-C5/C12-C14(Mounting / IC-Socket): Capacitors for power supply (3pieces)
	・ C6-C8/C15-C17(Mounting / IC-Socket): Capacitors for LCD external input voltage connection（3 pieces）
	・ C9,C18-C19: Capacitors for input voltage (3pieces)
	・ R1-R3/R4-R6(Mounting / IC-Socket): Resistance for LCD external input voltage connection（3 pieces）
	・ R7-R10,R11-R14: Resistance for light emitting diodes (P20-P23,P90-P93）
Pads for mounting	・ PP1/PP4(Mounting / IC-Socket): Pads for LCD drive power supply ・ PP2-PP3/PP5-PP6(Mounting / IC-Socket): Land for P10, P11 terminal connection
	・ PP7-PP14: Land for light emitting diodes
	・ AIN0-AIN15: Land for SA-ADC terminal connection
	・ CN1-CN4: Pads for peripheral board connectors（ 30pin×2、20pin×2、2.54mm pitch）
Other useful pads	・ VDD、VSS、UVDD、VREF、AIN0-AIN15
Operating voltage	・ VDD = +2.2V to +5.5V、VREF = +4.5V to +5.5V
Board size	・ 100.00 x 120.00 mm

3. Parts layout



<fig.1 Parts layout>



<fig.2 The device set direction>

4. Notes on use

(1) The information contained herein can change without notice owing to product and/or technical improvements.
Before using the product, please make sure that the information being referred to is up-to-date.

(2) Before using this board, read carefully and understand the contents of the ML610Q178 user's manual and the uEASE user's manual.

(3) The engineering sample of ML610Q178 might be mounted on the board.
Therefore, please confirm the characteristic finally by using MP of ML610Q178 and customer's mass production boards.

(4) LAPIS Semiconductor will not provide any support for this board, but the board can be exchanged with a new product only when it has an initial failure.

(5) When you set a device to a reference board, please set, where the power is turned off. Moreover, when a reference board is a " IC-socket", please set not to mistake direction of a device.
The direction of 1 pin is the right upper part direction, when a lid is opened. Please refer to figure 2.(about device set direction)

(6) When a power supply is inputted from the external, please input between check pin UVDD-VSS and set a PWR jumper to the USR side.

(7) Notes when the PWR jumper is set to USR side and the uEASE is connected.
Turn on the power supply of the peripheral board after starting the uEASE.
Moreover, Stop the uEASE after turning off the power supply of the peripheral board.

(8) When the PWR jumper is set to the uE side, the ability to supply power of the uEASE is +3.3v/100mA.

(9) Notes when the RESET_N signal is prepared on the peripheral board side.
If you use the uEASE, open or set DVDD-level RESET_N signal pin (CN3_71pin).
（When you control a RESET_N signal by the peripheral board, add a jumper terminal etc. to it and change into an open state.）

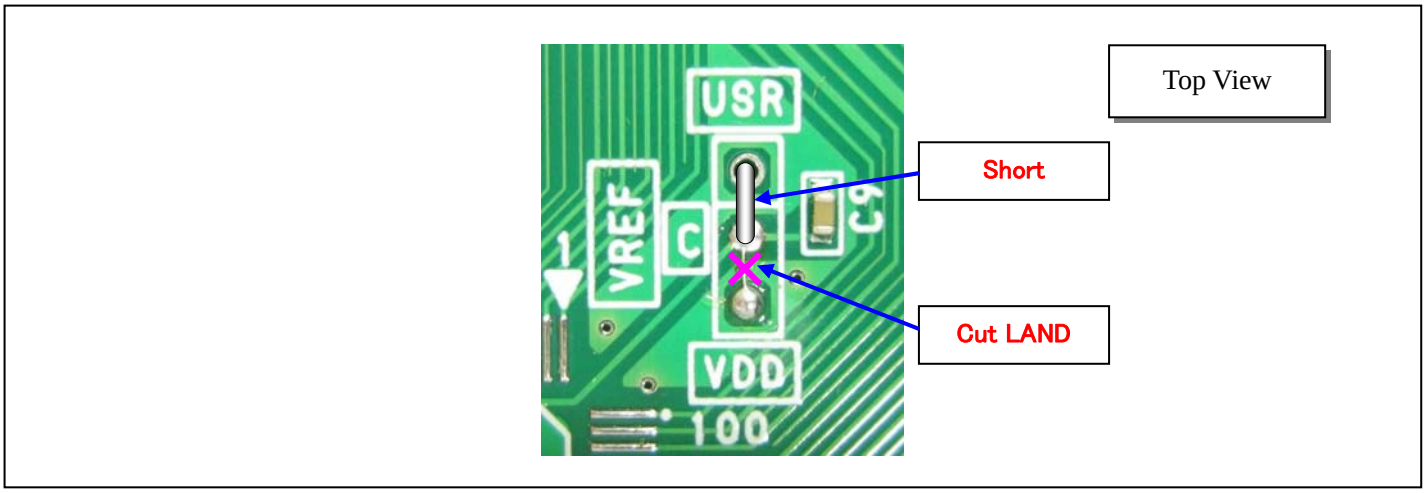
(10) There is a possibility of short the circuit when using it on electro conductive so that the board may have the pattern on the solder side. Therefore, please use the board on nonconductivity or put the protection parts on the solder side if necessary.

(11) When you use SA-ADC:
When you connect to AIN0-AIN15 on this board the target SA-ADC input and you do not input into it by CN2 course, please cut the pattern of AIN0-AIN15 if needed and input from the hole of the way near a device. Please refer to figure 4. (AIN0-AIN15 (SA-ADC))
VREF is connected with VDD by the jumper at the time of shipment. When you input arbitrary voltage, please change a VREF jumper to the USER side and input VREF voltage from 1_CN6 pin (VREF_IN). Please refer to figure 3. (VREF (SA-ADC))

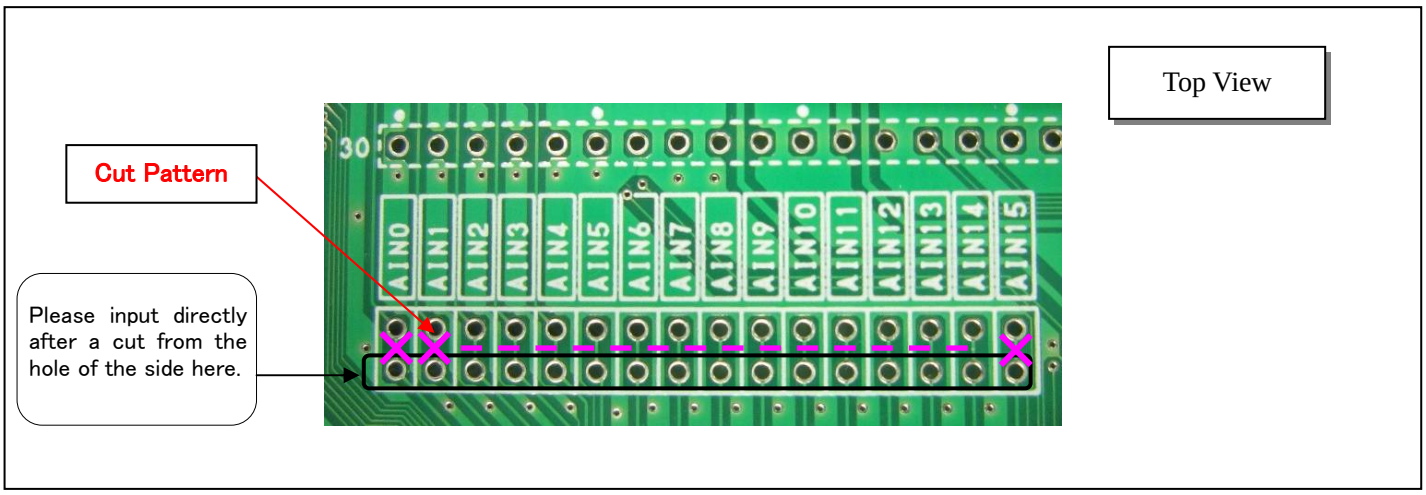
(12) When you don’t use light emitting diodes:
P20-P23, P90-P93 can drive direct to light emitting diodes. P20-P23, P90-P93 are wired with light emitting diodes through PP7-PP14. Please cut the land of the PP7-PP14 when you don’t use light emitting diodes, as shown in the fig.5.

(13) When driving LCD
The chip resistor of 2012 sizes can be mounted between VL3 to VDD (PP1 to PP4 pad). At the time of shipment, since VDD and VL3 short-circuit, please mount a chip resistor in PP1/PP4 if needed. Please refer to figure 6.(VL3)

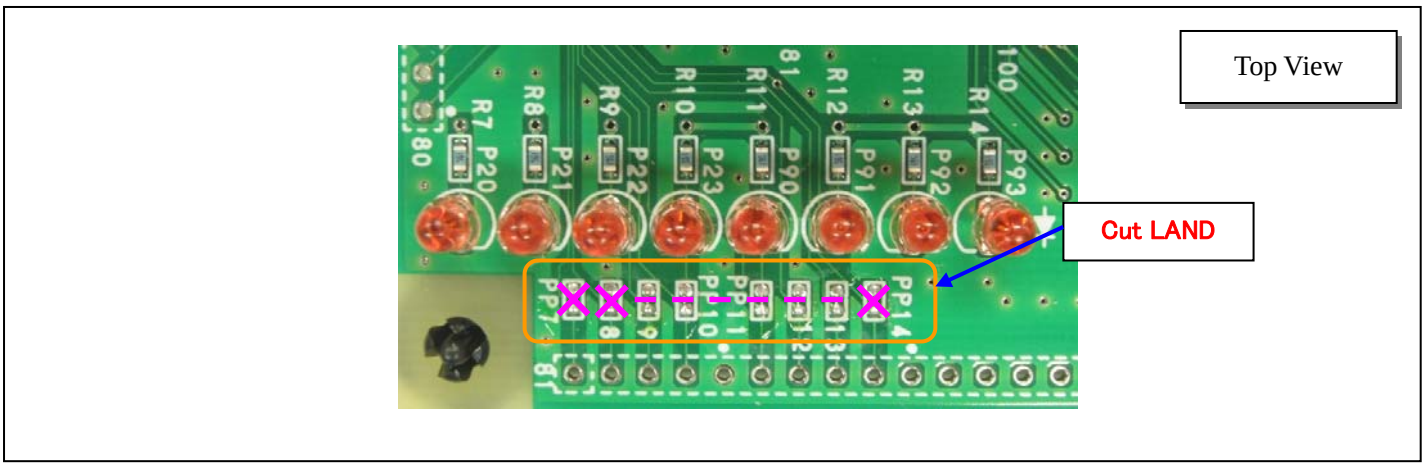
(14) When P10-P11 is used as general input ports
P10-P11 can change and use a 8MHz oscillation terminal and a general input port terminal. When you use it as a general input port terminal, please remove an 8MHz oscillator and short-circuit PP2/PP5 and PP3/PP6, respectively.
Please refer to figure 7. (P10,P11 8MHz oscillator)



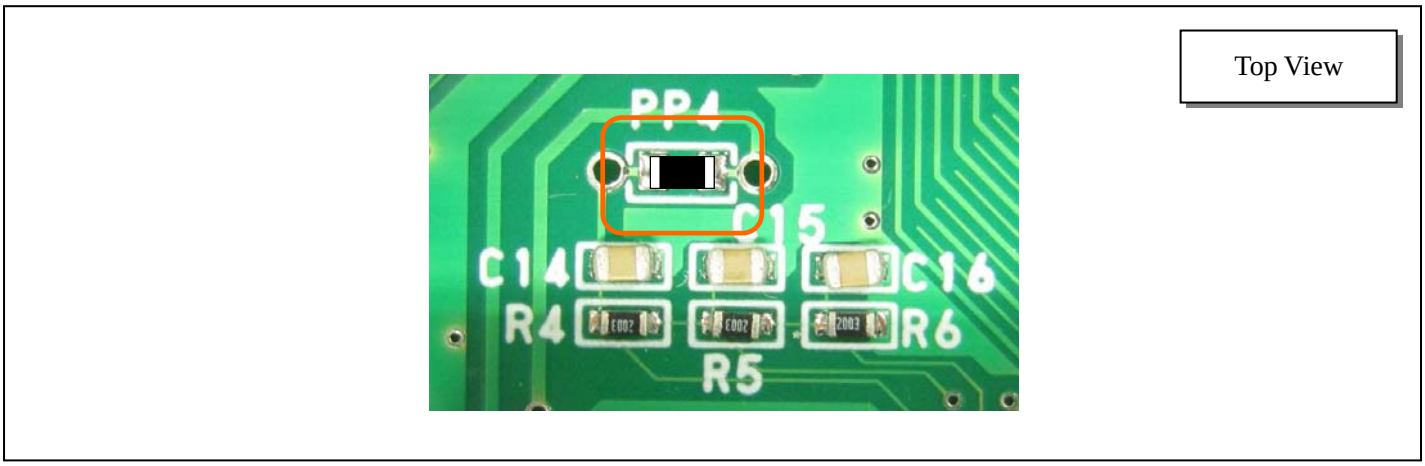
<fig.3 VREF(SA-ADC)>



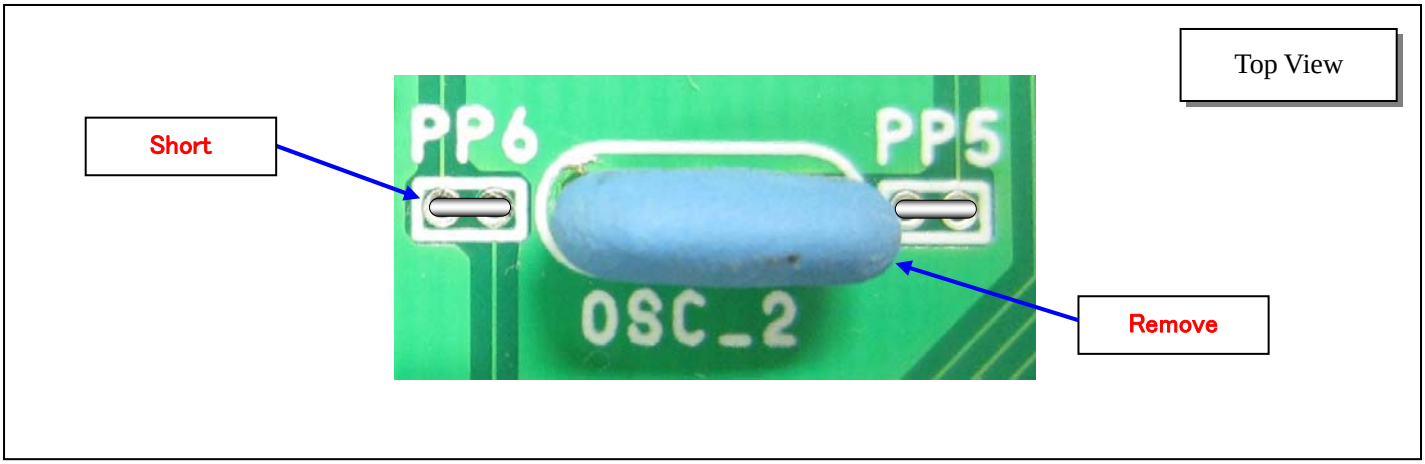
<fig.4 AIN0-AIN15 (SA-ADC)>



<fig.5 Light emitting diodes>



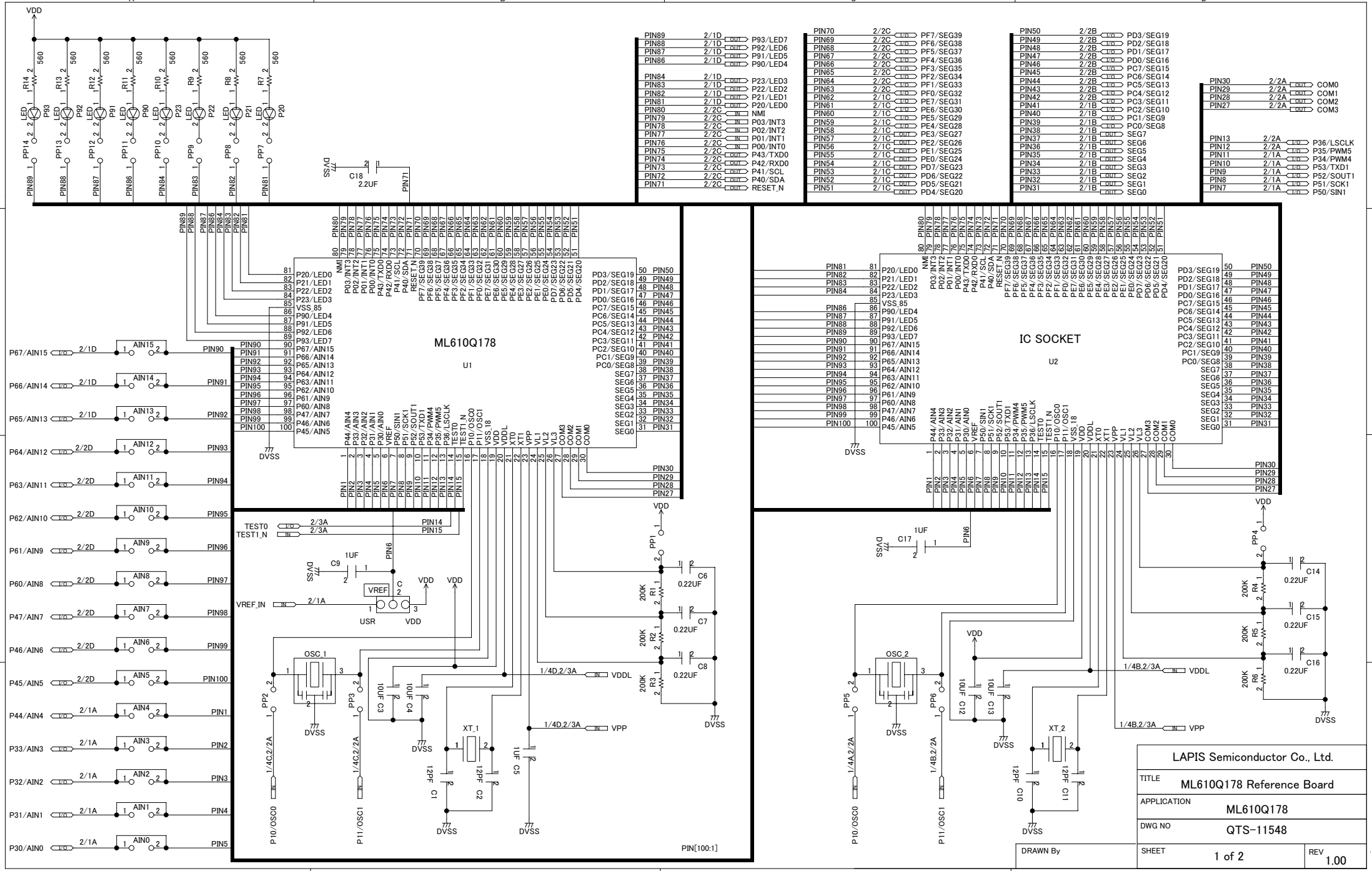
<fig.6 VL3>



<fig.7 P10,P11 8MHz oscillator>

5. Reference schematics

The reference circuit diagram of this reference board is shown after the following page.


ML610Q178
U1
IC SOCKET
U2
LAPIS Semiconductor Co., Ltd.
TITLE
ML610Q178 Reference Board
APPLICATION
ML610Q178
DWG NO
QTS-11548
DRAWN By
SHEET
1 of 2
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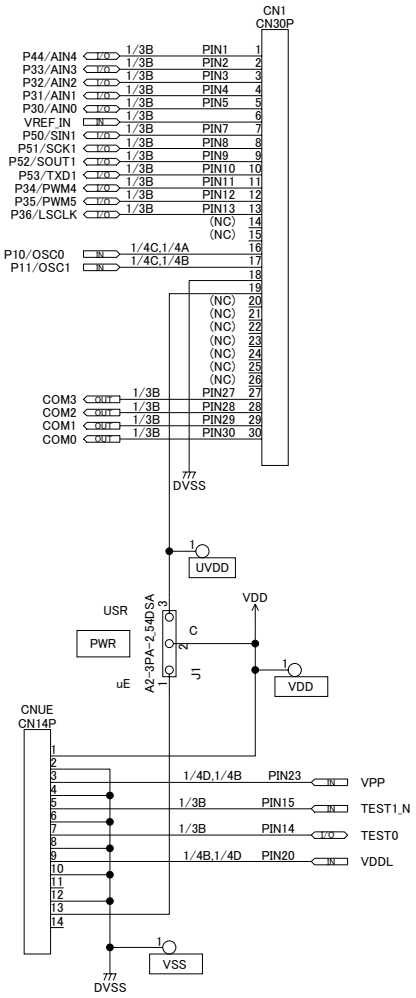
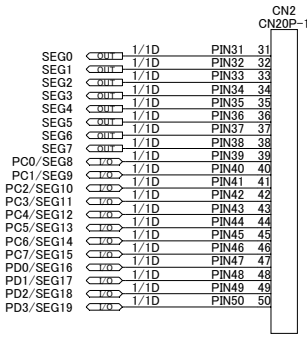
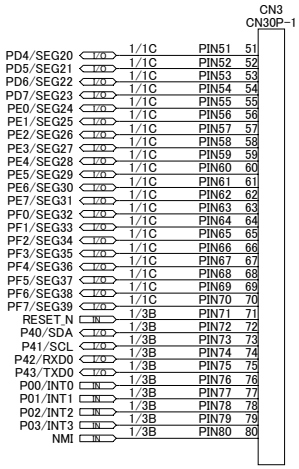
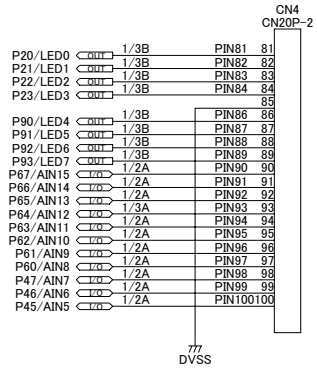



CN2
CN20P-1
SEG0 OUT 1/1D PIN31 31
SEG1 OUT 1/1D PIN32 32
SEG2 OUT 1/1D PIN33 33
SEG3 OUT 1/1D PIN34 34
SEG4 OUT 1/1D PIN35 35
SEG5 OUT 1/1D PIN36 36
SEG6 OUT 1/1D PIN37 37
SEG7 OUT 1/1D PIN38 38
PC0/SEG8 I/O 1/1D PIN39 39
PC1/SEG9 I/O 1/1D PIN40 40
PC2/SEG10 I/O 1/1D PIN41 41
PC3/SEG11 I/O 1/1D PIN42 42
PC4/SEG12 I/O 1/1D PIN43 43
PC5/SEG13 I/O 1/1D PIN44 44
PC6/SEG14 I/O 1/1D PIN45 45
PC7/SEG15 I/O 1/1D PIN46 46
PD0/SEG16 I/O 1/1D PIN47 47
PD1/SEG17 I/O 1/1D PIN48 48
PD2/SEG18 I/O 1/1D PIN49 49
PD3/SEG19 I/O 1/1D PIN50 50


CN3
CN30P-1
PD4/SEG20 I/O 1/1C PIN51 51
PD5/SEG21 I/O 1/1C PIN52 52
PD6/SEG22 I/O 1/1C PIN53 53
PD7/SEG23 I/O 1/1C PIN54 54
PE0/SEG24 I/O 1/1C PIN55 55
PE1/SEG25 I/O 1/1C PIN56 56
PE2/SEG26 I/O 1/1C PIN57 57
PE3/SEG27 I/O 1/1C PIN58 58
PE4/SEG28 I/O 1/1C PIN59 59
PE5/SEG29 I/O 1/1C PIN60 60
PE6/SEG30 I/O 1/1C PIN61 61
PE7/SEG31 I/O 1/1C PIN62 62
PF0/SEG32 I/O 1/1C PIN63 63
PF1/SEG33 I/O 1/1C PIN64 64
PF2/SEG34 I/O 1/1C PIN65 65
PF3/SEG35 I/O 1/1C PIN66 66
PF4/SEG36 I/O 1/1C PIN67 67
PF5/SEG37 I/O 1/1C PIN68 68
PF6/SEG38 I/O 1/1C PIN69 69
PF7/SEG39 I/O 1/1C PIN70 70
RESET_N IN 1/3B PIN71 71
P40/SDA I/O 1/3B PIN72 72
P41/SCL I/O 1/3B PIN73 73
P42/RXD0 I/O 1/3B PIN74 74
P43/TXD0 I/O 1/3B PIN75 75
P00/INT0 IN 1/3B PIN76 76
P01/INT1 IN 1/3B PIN77 77
P02/INT2 IN 1/3B PIN78 78
P03/INT3 IN 1/3B PIN79 79
NMI IN 1/3B PIN80 80


CN4
CN20P-2
P20/LED0 OUT 1/3B PIN81 81
P21/LED1 OUT 1/3B PIN82 82
P22/LED2 OUT 1/3B PIN83 83
P23/LED3 OUT 1/3B PIN84 84
85
P90/LED4 OUT 1/3B PIN86 86
P91/LED5 OUT 1/3B PIN87 87
P92/LED6 OUT 1/3B PIN88 88
P93/LED7 OUT 1/3B PIN89 89
P67/AIN15 I/O 1/2A PIN90 90
P66/AIN14 I/O 1/2A PIN91 91
P65/AIN13 I/O 1/2A PIN92 92
P64/AIN12 I/O 1/3A PIN93 93
P63/AIN11 I/O 1/2A PIN94 94
P62/AIN10 I/O 1/2A PIN95 95
P61/AIN9 I/O 1/2A PIN96 96
P60/AIN8 I/O 1/2A PIN97 97
P47/AIN7 I/O 1/2A PIN98 98
P46/AIN6 I/O 1/2A PIN99 99
P45/AIN5 I/O 1/2A PIN100100
DVSS

LAPIS Semiconductor Co., Ltd.		
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DRAWN By	SHEET 2 of 2	REV 1.00